YELLOWSTONE RIVER COMPACT COMMISSION

WYOMING MONTANA NORTH DAKOTA

THIRTY-FOURTH ANNUAL REPORT

1985

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YELLOWSTONE RIVER COMPACT COMMISSION

821 East Interstate Avenue
Bismarck, North Dakota

Honorable Ed Herschler
Governor of the State of Wyoming
Cheyenne, Wyoming

Honorable Ted Schwinden
Governor of the State of Montana
Helena, Montana

Honorable George Sinner
Governor of the State of North Dakota
Bismarck, North Dakota

Sirs:

Pursuant to Article III of the Yellowstone River Compact, the Commission submits the following thirty-fourth annual report of activities for the period ending September 30, 1985.

The Commission held the annual meeting at Billings, Montana, on November 26, 1985. Mr. George L. Christopulos, Wyoming State Engineer; Mr. Gary Fritz, Administrator, Water Resources Division, Montana Department of Natural Resources and Conservation; the designated representatives of their respective States; and Mr. L. Grady Moore, the designated Federal Representative and Chairman, were all present.

Others present were:
Joe Moreland, U.S. Geological Survey, Water Resources Division, Helena, Montana,
Jack Acord, Montana Department of Natural Resources and Conservation, Helena, Montana,
Chuck Dalby, Montana Department of Natural Resources and Conservation, Helena, Montana,
Tim Hall, Montana Department of Natural Resources and Conservation, Helena, Montana,
Richard Moy, Montana Department of Natural Resources and Conservation, Helena, Montana,
Clay Smith, Montana Attorney General's Office, Helena, Montana,
Vern Fahy, North Dakota State Engineer, Bismarck, North Dakota,
Gene Krenz, North Dakota State Water Commission, Bismarck, North Dakota,
Craig Cooper, Wyoming State Engineer's Office, Riverton, Wyoming,
Jeff Fassett, Wyoming State Engineer's Office, Cheyenne, Wyoming,

Paul Kawulok, Wyoming State Engineer's Office, Sheridan, Wyoming,
John Shields, Wyoming State Engineer's Office, Cheyenne, Wyoming,
Jennifer Hager, Wyoming Attorney General's Office, Cheyenne, Wyoming,
Richard Aldrich, Department of the Interior, Field Solicitor, Billings, Montana,
Tom Asay, Representative, District 50, Forsyth, Montana,
Bill Hergett, Rancher, Belfry, Montana,
Tom Barker, Fuller Water Project, Sheridan, Wyoming

The attention of the Commission is continuing to focus on the need to define the procedures for implementing Compact provisions for the time when development of water within the Yellowstone River basin requires that these provisions be administered.

The first item of business addressed was a letter sent by the Montana representative to the Wyoming and Federal members of the Commission. The letter asked the Commission to determine the applicability of Articles V and X of the Compact to the Middle Fork Powder River water-development project in Wyoming. The substantive question, as stated in the letter, is whether storage in the Middle Fork project's reservoir, attributable to Wyoming water permit 7548R, is subject to the percentage allocations in Article V.B.4 of the Compact. Part of the water to be used by the project has a 1940 priority date, but to date no storage has been developed to use the water. A related question concerns the applicability of Article X of the Compact to Middle Fork project water which would be diverted for industrial uses outside the basin.

The Montana member asked the Chairman to take the question under advisement and establish a hearing date and procedure. The Chairman asked for a conference call on December 19, 1985, at 10:00 a.m. to give the Chairman and the Wyoming member, who had both just received the letter, additional time to evaluate the letter and to consider an appropriate plan of action.

Review of 1985 Streamflow and Reservoir Operations.--Joe Moreland, District Chief of the U.S. Geological Survey Water Resources Division's District Office in Helena, Montana, presented the reservoir and streamflow data for the 1985 water year. The flows this year were 39-66 percent of those in 1984 and 47-70 percent of those for the period of record. The Powder and Tongue River flows were 357 and 358 percent, respectively, of those during the 1961 drought. These water-year comparisons are not an accurate reflection of summer 1985 streamflows, which generally were much lower than normal.

Update on the Geological Survey's Trend Analysis Study of Yellowstone River Basin Water Quality.--Mr. Moreland also discussed the Montana District's proposal for a water-quality trend study for the Yellowstone River basin. The original proposal was submitted

last year but did not receive funding from the U.S. Geological Survey. Mr. Moreland was asked to provide the Commission members with copies of the proposal. The Chairman was also asked to draft a letter to the Geological Survey's Regional Office in support of the project. During this discussion, the question of Commission support for flow and water-quality data on the Powder River at Moorhead was raised. There is not agreement among the Commissioners at this time that the Compact can be used to address water-quality issues. A discussion followed of the current status of the negotiations between Montana and Wyoming on Powder River issues.

Update on Clarks Fork Streamflow Forecasting Study.--Mr. John Shields discussed the status of the Clarks Fork streamflow forecasting study being conducted by the U.S. Soil Conservation Service's West National Technical Center in Portland, Oregon. A report on the work to date should be ready this winter. The Soil Conservation Service plans to provide a weekly forecast for the Clarks Fork River at Belfry, Montana during the April through September period.

Update on Wyoming Water Development Commission Activities.--The Commission is considering whether to seek Legislative approval to proceed with the environmental impact statement and permitting process activities for the Middle Fork Powder River project. Archeological studies are also presently being conducted on the project. The Goosebury Creek project (Bighorn basin) may be dropped after review of the economic feasibility study. The Clarks Fork project, with a proposed 750,000 acre-foot reservoir and potential power generation, may be a favorable project. Cost studies are being conducted on this project at this time.

Adjudication of Interstate Ditch Water Rights.--Claim forms for interstate ditch diversions were received and processed this year. During the summer, several discharge measurements and a field inspection were made. An ad hoc group consisting of Messrs. Grady Moore, Richard Moy, John Shields, and Chuck Dalby will meet (April 1986, Helena, Montana) to review the claims and mapping needs and to finalize plans for field verification.

Article V - An ad hoc group was established to finalize an acceptable administrative procedure for apportioning the Yellowstone tributary flows based on Article V of the Compact. Although the group did not officially meet this year, work has progressed on a prototype administrative model for the Tongue River. This group will meet (May 6 and 7, 1986, in Cody, Wyoming) to: 1) Discuss the Tongue River model and forge a mutual consensus on required assumptions for administration of Article V; 2) Examine the pros and cons of other apportionment procedures (such as the Milk River) and compare them with the Tongue River prototype; 3) Develop recommendations for a mutually acceptable administrative model that can be applied to all Yellowstone Compact tributaries.

Little Bighorn River Negotiations.--An accounting model has been developed to evaluate the hydrologic effects of the reservoir system. Montana has prepared two reports on this effort which are available to interested parties.

Geological Survey Management Implementation Plan.--Two years ago, the Geological Survey, Water Resources Division, prepared a Major River Systems Analysis Program for inclusion in the agencie's budget plan. This program has never been funded by Congress. The Geological Survey has obtained funding for the National Water Quality Assessment Program (NAWQAP). This program is designed to assess the quality of surface water, ground water, and precipitation. Individual projects will probably be based on a basin-wide assessment approach.

Adjournment.--The Chairman asked if there was any other business. There was none. The meeting adjourned at 1:30 p.m.

The budgets for fiscal years 1986 through 1987 are discussed in the following general report. The amount of funds required for future Commission activities will depend largely on the outcome of water-development plans, budget changes, and degree of water administration required.

Respectfully submitted,

George L. Christopulos
Commissioner for Wyoming

Gary Fritz
Commissioner for Montana

L. Grady Moore
Federal Representative

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GENERAL REPORT

Cost of operation and budget

The work funded by the Commission, which to date has been primarily concerned with the collection of required hydrologic data, has been financed through cooperative arrangements whereby Montana and Wyoming each bear one-fourth of the cost and the remaining one-half is borne by the United States. The salaries and necessary expenses of the State and Federal representatives, and hydrologic data made available by other agencies, are not evaluated or considered as expenses of the Commission.

The expense of the Commission during fiscal year 1985 was $30,840, in accordance with the budget adopted for the year.

The budgets for fiscal years 1986 and 1987 were tentatively adopted subject to the availability of appropriations.

The budgets for the three fiscal years are summarized as follows:

October 1, 1984, to September 30, 1985 (fiscal year 1985):	
Continuation of existing stream-gaging programs	$30,840
October 1, 1985, to September 30, 1986 (fiscal year 1986):	
Continuation of existing stream-gaging programs	$32,000
October 1, 1986, to September 30, 1987 (fiscal year 1987):	
Estimate of continuation of existing stream-gaging programs	$33,200

Stream-gaging-station operation

Gaging stations at the measuring sites specified in the Compact were continued in operation and satisfactory discharge records collected at each. Locations of gaging and reservoir stations are shown on a map of the Yellowstone River Basin at the end of the report.

During the water year ending September 30, 1985, annual streamflow was below average in all four tributaries of the Yellowstone River as given in the following table:

Measurement point	Percent of average
Clarks Fork Yellowstone River near Silesia, Mont.	63
Bighorn River above Tullock Creek, near Bighorn, minus Little Bighorn River near Hardin, Mont. Adjusted for change in contents in Bighorn Lake	70
Tongue River at Miles City, Mont.	47
Powder River near Locate, Mont.	47

Details of streamflow for water year 1985 and bar graphs showing comparisons with average flows during selected base periods and with the preceding year are given in the section "Monthly summary of discharge for Compact stream-gaging stations."

Diversions

No incidents during the year required administration of the water in accordance with the provisions of the Compact. At the present level of water-resources development, the Commission believes that a program of intensive water-use regulations is not necessary.

Storage in reservoirs

Reservoirs completed after January 1, 1950

Bighorn Lake, a U.S. Bureau of Reclamation project on the Bighorn River, and the largest storage project in the basin, contained 1,069,000 acre-feet at the beginning of the year and 856,200 acre-feet at the close. It fluctuated from a minimum of 827,400 acre-feet on March 10, 1985, to a maximum of 1,070,000 acre-feet on October 2, 1984. Boysen Reservoir, located on the Wind River and operated by the U.S. Bureau of Reclamation, began the year with 695,400 acre-feet in storage and ended with 540,200 acre-feet. Details regarding these reservoirs are given in the section "Monthly summary of contents for Compact reservoirs completed after January 1, 1950." The Commission is cognizant of other reservoirs in this general group and considers their aggregate effect to be insufficient to warrant the collection of storage data at this time.

Reservoirs existing on January 1, 1950

As a matter of record and general information, month-end storage data are given later in the report for reservoirs in existence upstream from the points of measurement on January 1, 1950. These data are pertinent to allocation under Article V, Section C, Item 5 of the Compact.

06208800 Clarks Fork Yellowstone River near Silesia, Mont.

LOCATION.--Lat 45°30'48", long 108°49'42", in NW1/4 SE1/4 sec. 1, T. 4 S., R. 23 E., Carbon County, Hydrologic Unit 10070006, on left bank 0.5 mi downstream from Whitehorse Canal intake, 1 mi upstream from Rock Creek, 3 mi south of Silesia, and at mile 16.3.

DRAINAGE AREA.--2,093 mi^2.

PERIOD OF RECORD.--October 1969 to current year. Records for July 1921 to September 1969 (published as Clarks Fork Yellowstone River at Edgar) at site 5.8 mi upstream not equivalent owing to diversion in Whitehorse Canal during irrigation season. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Datum of gage is 3,405.79 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS.--Estimated daily discharges during the year: Dec. 2-7, Dec. 11 to Mar. 10. Records good except those for periods of estimated record, which are poor. Diversion for irrigation of about 45,900 acres, of which 2,180 acres lies below station. In addition, about 56,200 acres of land upstream of station are irrigated by diversions from the adjoining Rock Creek basin.

AVERAGE DISCHARGE.--16 years, 1,146 ft^3/s, 830,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,500 ft^3/s June 10, 1981, gage height, 8.36 ft; minimum, 56 ft^3/s Apr. 25, 1981, gage height, 0.53 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base of 5,300 ft^3/s and maximums(*):

Date	Time	Discharge ft^3/s	Gage height
June 9	1000	*6,000	*5.77

No other peak greater than base discharge.

Minimum discharge, 166 ft^3/s Apr. 30.

Month	Second-foot days	Mean	Maximum	Minimum	Runoff, in acre-feet
October 1984	19,514	629	733	588	38,710
November	17,686	590	702	472	35,080
December	12,519	404	583	230	24,830
January 1985	14,050	453	540	260	27,870
February	11,070	395	500	270	21,960
March	12,023	388	450	330	23,850
April	12,645	422	751	178	25,080
May	46,591	1,503	3,840	258	92,410
June	66,481	2,216	5,830	971	131,900
July	20,042	647	946	364	39,750
August	14,921	481	1,010	188	29,600
September 1985	15,375	513	786	186	30,500
1985 water year	262,917	720	5,830	178	521,500

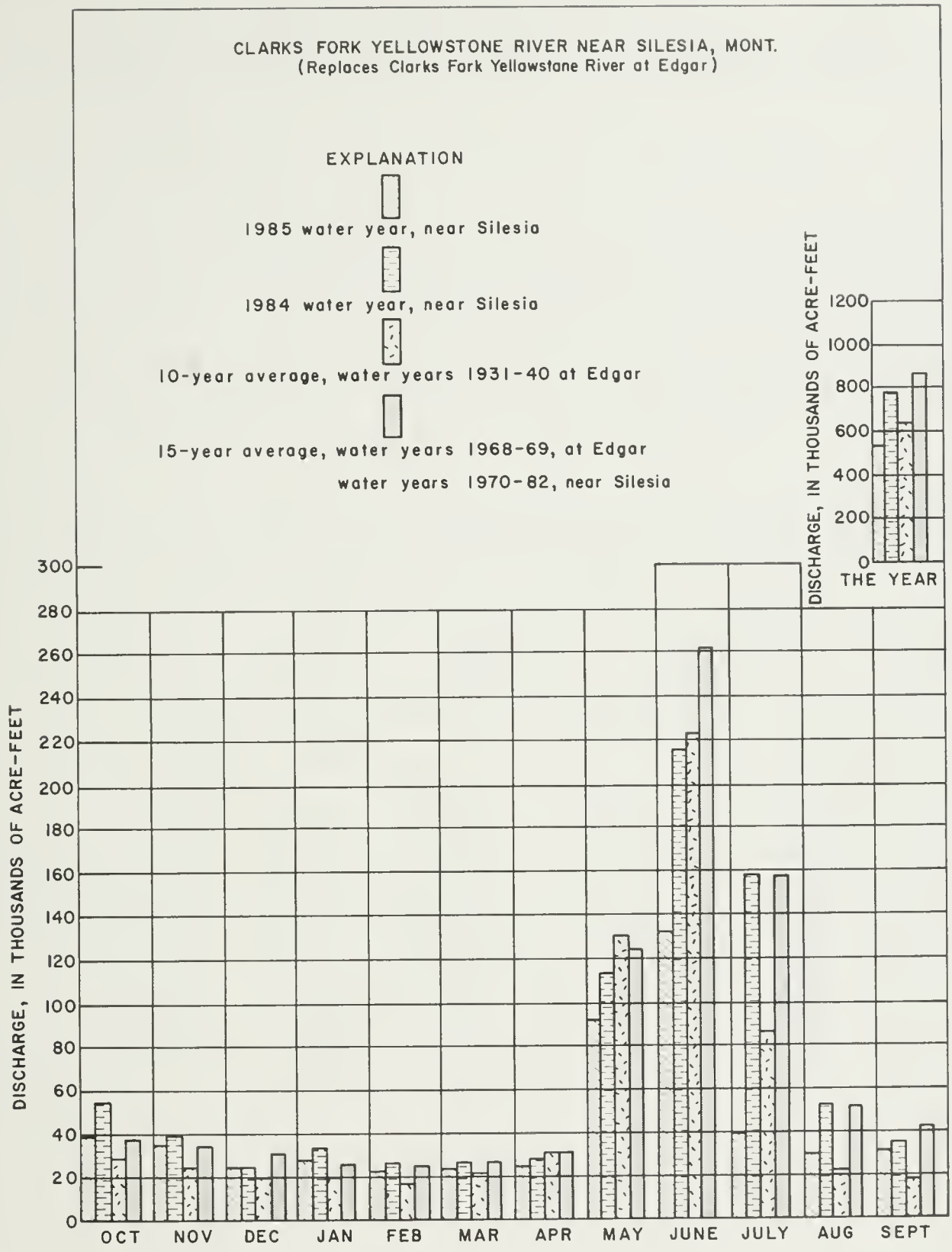


Figure 1.--Comparison of discharge for 1985 water year with 1984 water year near Silesia and with average discharge for water years 1931-40 at Edgar and for water years 1968-69 at Edgar and 1970-82 near Silesia.

06294000 Little Bighorn River near Hardin, Mont.

LOCATION.--Lat 45°44'09", long 107°33'24", in SE1/4 NE1/4 NE1/4 sec. 19, T. 1 S., R. 34 E., Big Horn County, Hydrologic Unit 10080016, on left bank 50 ft downstream from bridge on Sarpy Road, 0.2 mi upstream from terminal wasteway of Agency Canal, 0.6 mi upstream from mouth, and 2.3 mi east of Hardin.

DRAINAGE AREA.--1,294 mi^2.

PERIOD OF RECORD.--June 1953 to current year. Records since June 1953 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Datum of gage is 2,882.29 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 7, 1953, nonrecording gage at site 0.4 mi downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mi downstream. May 6, 1963, to Nov. 6, 1963, nonrecording gage at site 0.4 mi downstream. All at different datums. Nov. 7, 1963, to Aug. 15, 1976, water-stage recorder at site 35 ft downstream at present datum. Aug. 15, 1976, to Sept. 30, 1979, water-stage recorders located on each bank downstream of Sarpy Road bridge and were used depending on control conditions.

REMARKS.--Estimated daily discharges during the year: Nov. 27 to Apr. 2. Records good except those for period of estimated record, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity 23,000 acre-ft). Diversions for irrigation of 20,980 acres above station. Figures of discharge given herein include flow of terminal wasteway of Agency Canal.

AVERAGE DISCHARGE.--32 years, 311 ft^3/s, 225,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,600 ft^3/s, May 19, 1978, gage height, 11.20 ft, used gage height as obtained at bridge on Sarpy Road; maximum gage height, 11.78 ft Mar. 20, 1960, site and datum then in use (backwater from ice); minimum discharge observed, 0.20 ft^3/s Aug. 7, 1961, result of discharge measurement.

EXTREMES FOR CURRENT YEAR--Peak discharges above base of 1,000 ft^3/s and maximums(*):

Date	Time	Discharge ft^3/s	Gage height
Apr. 4	0330	*2,050	*4.73

No other peaks greater than base discharge.

Minimum discharge, 38 ft^3/s Sept. 2, 8, 9.

Month	Second-foot days	Mean	Maximum	Minimum	Runoff, in acre-feet
October 1984	5,175	167	206	153	10,260
November	5,059	169	199	145	10,030
December	6,265	202	350	100	12,430
January 1985	5,210	168	230	90	10,330
February	4,940	176	230	100	9,800
March	5,710	184	250	130	11,330
April	13,635	455	1,510	202	27,050
May	8,222	265	398	165	16,310
June	5,593	186	250	119	11,090
July	2,160	69.7	129	38	4,280
August	3,011	97.1	146	46	5,970
September 1985	2,333	77.8	151	38	4,630
1985 water year	67,313	184	1,510	38	133,500

06294500 Bighorn River above Tullock Creek, near Bighorn, Mont.

LOCATION.--Lat 46°07'29", long 107°28'06", in SE1/4 SE1/4 NE1/4 sec. 3, T. 4 N., R. 34 E., Treasure County, Hydrologic Unit 10080015, on right bank, 1.9 mi upstream from Tullock Creek, 3.0 mi upstream from mouth, 3.6 mi southwest of Bighorn, and 4.5 mi southeast of Custer.

DRAINAGE AREA.--22,414 mi^2. Area at site used Oct. 7, 1955, to Sept. 30, 1981, 22,885 mi^2.

PERIOD OF RECORD.--Oct. 1, 1981, to current year. Records since January 1950 available in annual reports of the Yellowstone River Compact Commission. Previously, published as "06294700 Bighorn River at Bighorn, MT," 1956-81, and as "near Custer," 1945-55. Flows are equivalent at all sites.

GAGE.--Water-stage recorder. Elevation of gage is 2,700 ft above National Geodetic Vertical Datum of 1929, from topographic map. May 11 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder at different datum. Oct. 7, 1955, to Sept. 30, 1981, at site 2.3 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Dec. 17 to Mar. 6. Records good except those for estimated daily discharges, which are poor. Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft; see sections "Monthly summary of contents for Compact reservoirs." Diversions for irrigation of about 445,200 acres upstream of station.

AVERAGE DISCHARGE.--40 years (water years 1946-81, 1982-85), 3,927 ft^3/s 2,845,000 acre-ft/yr, unadjusted.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 59,200 ft^3/s May 20, 1978, gage height, 14.15 ft; maximum gage height recorded, 14.21 ft Apr. 2, 1965 (ice jam); minimum discharge, about 275 ft^3/s Nov. 15, 1959, result of freezeup; minimum daily, 400 ft^3/s Apr. 4, 1967.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s July 4, 1983, gage height, 5.66 ft; maximum gage height, 8.52 ft Jan. 14, 1982 (ice jam); minimum daily discharge, 1,260 ft^3/s July 12, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,870 ft^3/s Nov. 25, 26, gage height, 3.23 ft; maximum gage height, 8.65 ft Jan. 13, backwater from ice; minimum daily discharge, 1,260 ft^3/s July 12.

Month	Second-foot days	Mean	Maximum	Minimum	Runoff, in acre-feet	Adjusted runoff, in acre-feet*
October 1984	135,250	4,363	4,690	2,150	268,300	220,000
November	140,340	4,678	4,840	4,040	278,400	220,700
December	118,460	3,821	4,220	2,900	235,000	174,900
January 1985	102,900	3,319	4,200	2,400	204,100	146,600
February	101,300	3,618	4,500	2,600	200,900	138,600
March	109,530	3,533	4,000	3,200	217,300	217,800
April	97,580	3,253	4,510	2,830	193,500	151,600
May	70,160	2,263	2,860	1,790	139,200	162,700
June	59,220	1,974	2,240	1,750	117,500	133,500
July	48,180	1,554	1,930	1,260	95,570	68,100
August	59,650	1,924	2,070	1,740	118,300	83,100
September 1985	61,550	2,052	2,240	1,920	122,100	126,400
1985 water year	1,104,120	3,025	4,840	1,260	2,190,000	1,843,700

*Adjusted for change in contents in Bighorn Lake minus Little Bighorn River near Hardin.

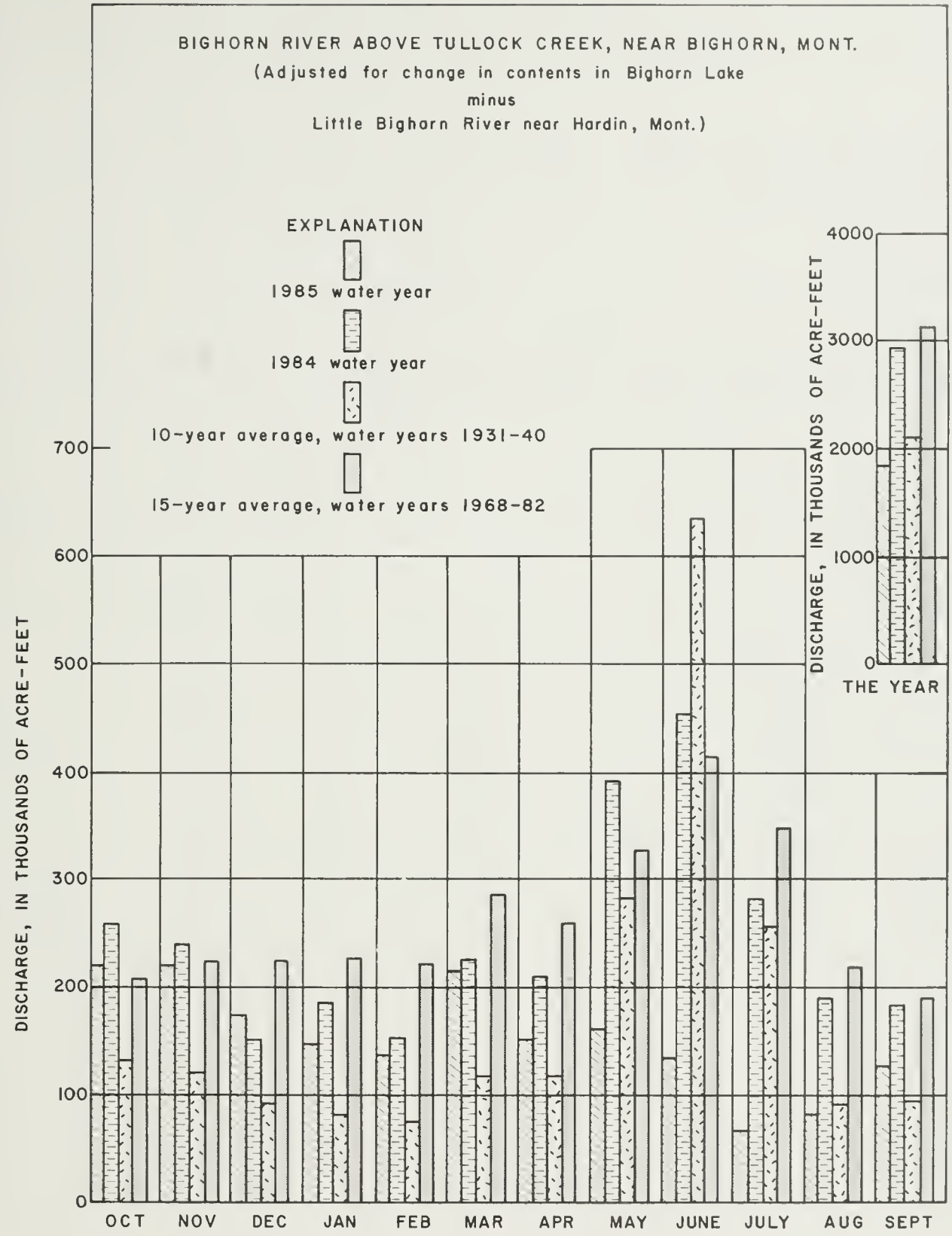


Figure 2.--Comparison of discharge for 1985 water year with 1984 water year and with average discharge for water years 1931-40 and 1968-82.

06308500 Tongue River at Miles City, Mont.

LOCATION.--Lat 46°20'44", long 105°48'10", in NE1/4 NE1/4 SE1/4 sec. 23, T. 7 N., R. 47 E., Custer County, Hydrologic Unit 10090102, on right bank 4 mi south of Miles City and at mile 8.1.

DRAINAGE AREA.--5,379 mi^2.

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to current year. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharges only for some periods, published in WSP 1309. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

GAGE.--Water-stage recorder. Datum of gage is 2,375.76 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). April 1938 to April 1942, nonrecording gage at site 8 mi upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft higher.

REMARKS.--Records good except those for Aug. 5 to Sept. 30, which are fair, and estimated days, Oct. 30 to Nov. 5, Nov. 11-14, Nov. 18 to Mar. 25, and May 5-8, which are poor. Flow regulation by Tongue River Reservoir (see section "Monthly summary of contents for Compact reservoirs existing on January 1, 1950") and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft). Diversions for irrigation of about 100,800 acres upstream of station.

AVERAGE DISCHARGE.--42 years (1938-41, 1946-85), 436 ft^3/s, 315,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,300 ft^3/s June 15, 1962, gage height, 12.33 ft, present datum, from rating curve extended above 8,220 ft^3/s on basis of float measurement; maximum gage height, 13.27 ft, Mar. 19, 1960, Feb. 15, 1971 (ice jam), present datum; no flow July 9-19, Aug. 13, 14, Sept. 28, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft^3/s Aug. 3, gage height, 3.68 ft; maximum gage height, 5.29 ft Mar. 19 (ice jam); minimum daily discharge, 26 ft^3/s Aug. 28.

Month	Second-foot days	Mean	Maximum	Minimum	Runoff, in acre-feet
October 1984	5,398	174	248	124	10,710
November	7,883	263	350	180	15,640
December	5,170	167	230	130	10,250
January 1985	5,990	193	250	130	11,880
February	6,540	234	340	130	12,970
March	13,261	428	900	220	26,300
April	11,135	371	707	212	22,090
May	4,485	145	273	28	8,900
June	4,171	139	177	80	8,270
July	2,229	71.9	327	27	4,420
August	4,101	132	928	26	8,130
September 1985	4,347	145	351	64	8,620
1985 water year	74,710	205	928	26	148,200

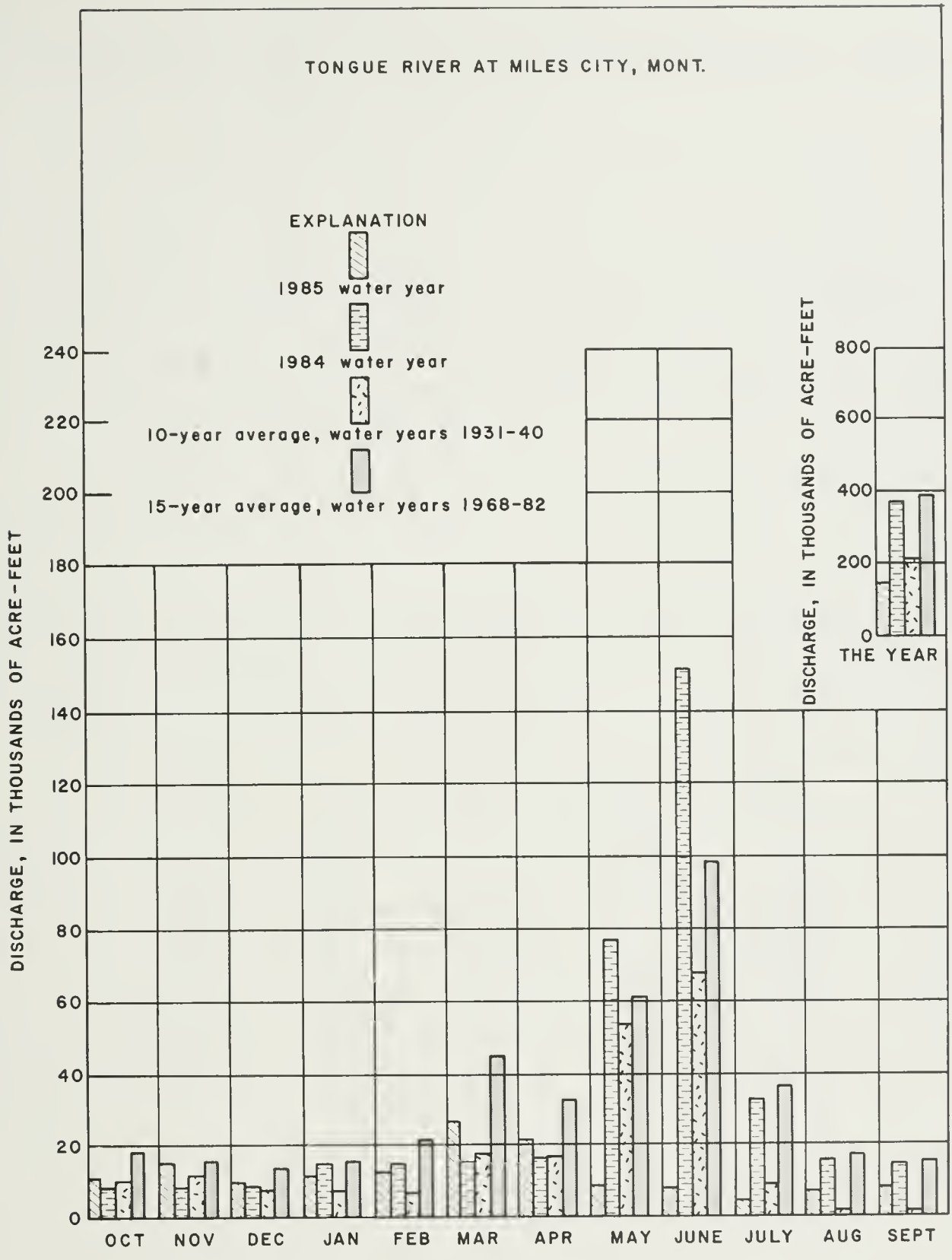


Figure 3.--Comparison of discharge for 1985 water year with 1984 water year and with average discharge for water years 1931-40 and 1968-82.

06326500 Powder River near Locate, Mont.

LOCATION.--Lat 46°26'56", long 105°18'44", in NW1/4 SW1/4 sec. 14, T. 8 N., R. 51 E., Custer County, Hydrologic Unit 10090209, on left bank 1.5 mi downstream from bridge on old U.S. Highway 12 at present site of Locate, 1.5 mi upstream from Locate Creek, 5 mi west of former site of Locate, 25 mi east of Miles City, and at mile 27.9.

DRAINAGE AREA.--13,194 mi^2. Drainage area at site 1.5 mi upstream, 13,189 mi^2.

PERIOD OF RECORD.--March 1938 to current year. Records since January 1950 available in annual reports of Yellowstone River Compact Commission.

REVISED RECORDS.--WSP 926: 1939. WSP 1309: 1938-39 (M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,384.79 ft National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to July 11, 1947, nonrecording gage at bridge 1.5 mi upstream, and July 11, 1947, to Sept. 30, 1965, water-stage recorder at site near upstream bridge at different datum. Oct. 1, 1965, to Oct. 4, 1966, nonrecording gage, and Oct. 5, 1966, to Mar. 21, 1978, water-stage recorder at present site and datum. Mar. 22, 1978, to Apr. 23, 1981, water-stage recorder 1.5 mi upstream at different datum, Apr. 24 to Aug. 20, 1981, water-stage recorder at present site and datum, and Aug. 21, 1981, to Sept. 30, 1981, water-stage recorder 1.5 mi upstream at different datum. Effective Oct. 1, 1981, recording and nonrecording gages will be maintained at both the upstream and present gage locations and each site will be employed depending on the water-stage control conditions and for the capability of recording useful gage-height data.

REMARKS.--Estimated daily discharges during water year: Oct. 31 to Nov. 3 and Nov. 26 to Mar. 19. Records fair except those for estimated periods, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft. Diversions for irrigation of about 101,800 acres above station.

AVERAGE DISCHARGE.--47 years, 606 ft^3/s, 439,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 31,000 ft^3/s Feb. 19, 1943, maximum gage height, 12.27 ft Mar. 16, 1978 (backwater from ice); no flow Jan. 16 to Feb. 12, Feb. 22-24, 1950, July 27, Sept. 21-27, Oct. 1, 1960, Sept. 4-8, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,480 ft^3/s Mar. 19, gage height, 6.54 ft, no other peaks above base of 5,000 ft^3/s; maximum gage height, 7.56 ft Mar. 19 (backwater from ice); minimum discharge, 0.80 ft^3/s July 16.

Month	Second-foot days	Mean	Maximum	Minimum	Runoff, in acre-feet
October 1984	8,615	278	327	177	17,090
November	9,583	319	387	250	19,010
December	4,995	161	230	90	9,910
January 1985	5,180	167	250	70	10,270
February	3,890	139	350	60	7,720
March	31,850	1,027	4,300	210	63,170
April	17,148	572	735	448	34,010
May	11,262	363	576	164	22,340
June	4,591	153	312	14	9,110
July	485.8	15.7	191	1.5	964
August	4,353.8	140	1,060	8.9	8,640
September 1985	1,615.9	53.9	198	6.0	3,210
1985 water year	103,569.5	284	4,300	1.5	205,400

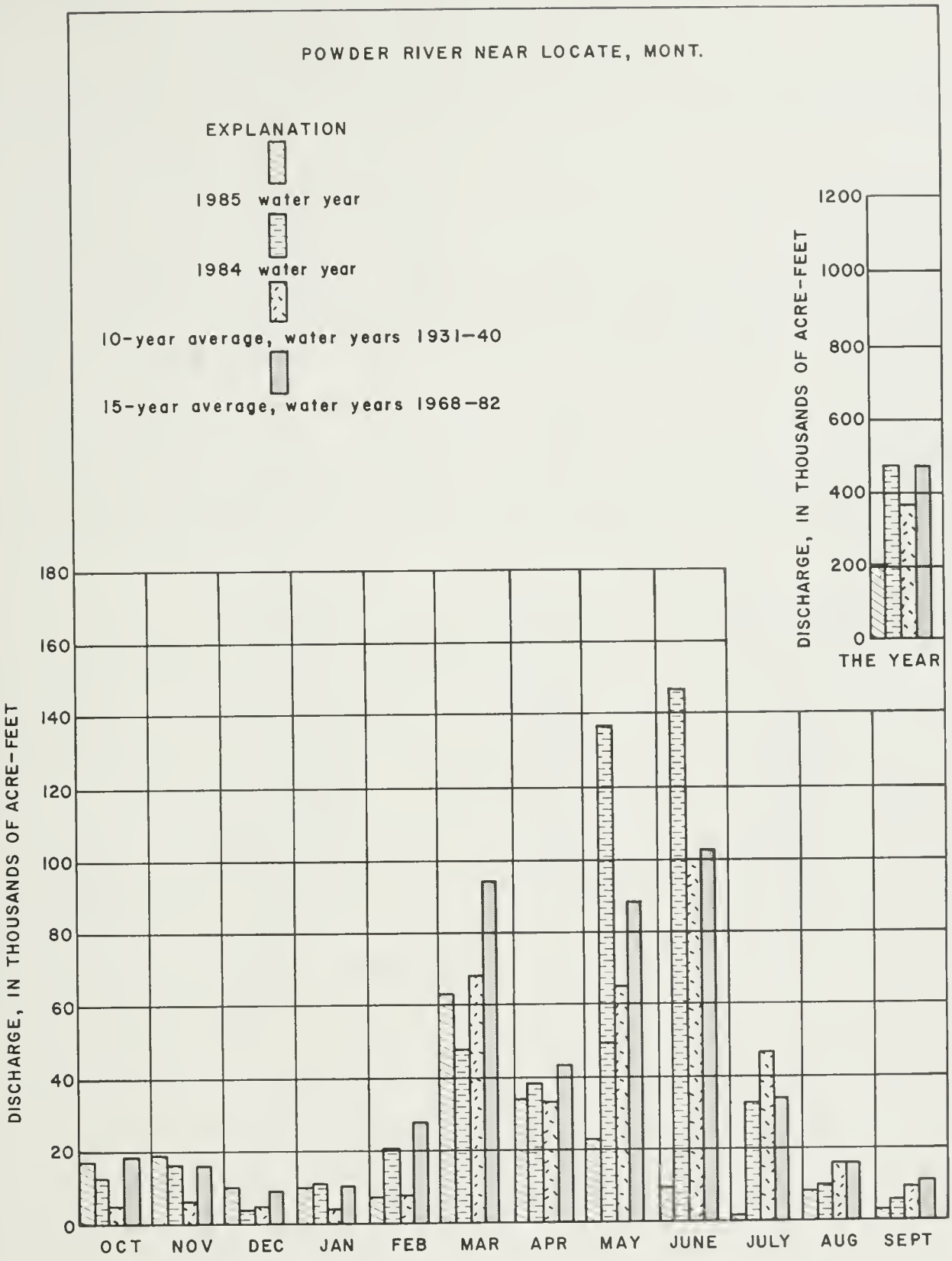


Figure 4.--Comparison of discharge for 1985 water year with 1984 water year and with average discharge for water years 1931-40 and 1968-82.

06258900 Boysen Reservoir, Wyo.

LOCATION.--Lat 43°25'00", long 108°10'37", in NW1/4 NW1/4 sec. 16, T. 5 N., R. 6 E., Fremont County, Hydrologic Unit 10080005, at dam on Wind River and 13 mi north of Shoshoni, Wyoming.

DRAINAGE AREA.--7,700 mi^2.

PERIOD OF RECORD.--October 1951 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

REMARKS.--Reservoir is formed by rock-fill dam completed in October 1951. Storage began Oct. 11, 1951. Usable capacity, 742,100 acre-ft between elevation 4,657.00 ft, invert of penstock pipe, and 4,725.00 ft, top of spillway gate. Dead storage, 59,880 acre-ft below elevation 4,657.00 ft. Prior to Jan. 1, 1966, usable capacity was 757,800 acre-ft and dead storage was 62,000 acre-ft at same elevations. Crest of dam is at elevation 4,758 ft. Figures given herein represent usable contents. Water used for irrigation, flood control, and power development.

COOPERATION.--Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum usable daily contents, 862,500 acre-ft July 6, 7, 1967, elevation, 4,730.83 ft; minimum usable daily since normal use of water started, 191,900 acre-ft Mar. 18, 19, 1956, elevation, 4,684.18 ft, capacity table then in use.

EXTREMES FOR CURRENT YEAR.--Maximum usable contents, 696,200 acre-ft Oct. 5, elevation, 4,722.60 ft; minimum usable, 480,900 acre-ft May 5, elevation, 4,709.73 ft.

Month	Water-surface elevation, in feet	Contents*, in acre-feet	Change in contents, in acre-feet
September 30, 1984.	4,722.56	695,400	
October 31.	4,722.23	689,200	-6,200
November 30	4,719.92	647,000	-42,200
December 31	4,716.15	581,700	-65,300
January 31, 1985.	4,713.85	544,100	-37,600
February 28	4,711.93	514,100	-30,000
March 31.	4,710.90	498,400	-15,700
April 30.	4,709.87	483,000	-15,400
May 31.	4,711.34	505,100	+22,100
June 30	4,713.60	540,200	+35,100
July 31	4,713.35	536,200	-4,000
August 31	4,713.05	531,500	-4,700
September 30, 1985.	4,713.60	540,200	+8,700
1985 water year			-155,200

*Does not include dead storage of 59,880 acre-ft.

06260300 Anchor Reservoir, Wyo.

LOCATION.--Lat 43°39'50", long 108°49'27", in sec. 26, T. 43 N., R. 100 W., Hot Springs County, Hydrologic Unit 10080007, at dam on South Fork Owl Creek, 2 mi downstream from Middle Fork, 3 mi southeast of Anchor, and 32 mi west of Thermopolis.

DRAINAGE AREA.--131 mi^2.

PERIOD OF RECORD.--November 1960 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (U.S. Bureau of Reclamation benchmark).

REMARKS.--Reservoir is formed by concrete arch dam completed in 1960. Usable capacity, 17,170 acre-ft between elevation 6,343.75 ft, invert of river outlet, and 6,441.00 ft, spillway crest, not including 68 acre-ft below elevation 6,343.75 ft. Prior to Oct. 1, 1971, usable capacity was 17,280 acre-ft not including 149 acre-ft below the invert. Figures given herein represent usable contents. Water is used for irrigation of land in Owl Creek basin.

COOPERATION.--Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 9,250 acre-ft July 4, 1967 (elevation, 6,418.52 ft); no storage on many days each year.

EXTREMES FOR CURRENT YEAR.--No usable storage during year.

Month	Water-surface elevation, in feet	Contents*, in acre-feet	Change in contents, in acre-feet
September 30, 1984.	6,304.30	0	0
October 31.	6,304.30	0	0
November 30	6,304.30	0	0
December 31	6,304.30	0	0
January 31, 1985.	6,304.30	0	0
February 28	6,304.30	0	0
March 31.	6,304.30	0	0
April 30.	6,340.00	0	0
May 31.	6,340.00	0	0
June 30	6,304.30	0	0
July 31	6,340.00	0	0
August 31	6,304.30	0	0
September 30, 1985.	6,304.30	0	0
1984 water year			0

*Does not include dead storage of 68 acre-ft.

06286400 Bighorn Lake near St. Xavier, Mont.

LOCATION.--Lat 45°18'27", long 107°57'26", in SW1/4 SE1/4 sec. 18, T. 6 S., R. 31 E., Big Horn County, Hydrologic Unit 10080010, in block 13 of Yellowtail Dam on Bighorn River, 1.3 mi upstream from Grapevine Creek, 15.5 mi southeast of St. Xavier, and at mile 86.6.

DRAINAGE AREA.--19,626 mi^2.

PERIOD OF RECORD.--November 1965 to current year (monthend contents only). Prior to October 1969, published as "Yellowtail Reservoir."

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

REMARKS.--Reservoir is formed by thin concrete-arch dam; construction began in 1961; completed in 1967. Storage began Nov. 3, 1965. Usable capacity, 1,356,000 acre-ft between elevation 3,296.50 ft, river outlet invert, and 3,657.00 ft, top of flood control. Elevation of spillway crest, 3,593.00 ft. Normal maximum operating level, 1,097,000 acre-ft, elevation, 3,640.00 ft. Minimum operating level, 483,400 acre-ft, elevation 3,547.00 ft. Dead storage, 18,970 acre-ft below elevation 3,296.50 ft. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

COOPERATION.--Elevations and capacity table furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 1,346,000 acre-ft July 6, 1967, elevation, 3,656.43 ft; minimum since first filling, 660,700 acre-ft Mar. 11, 1970, elevation, 3,584.45 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 1,070,000 acre-ft Oct. 2, elevation, 3,637.82 ft; minimum, 827,400 acre-ft Mar. 10, elevation, 3,611.25 ft.

Month	Water-surface elevation, in feet	Contents*, in acre-feet	Change in contents, in acre-feet
September 30, 1984	3,637.74	1,069,000	
October 31	3,634.41	1,031,000	-38,000
November 30	3,629.85	983,300	-47,700
December 31	3,624.71	935,600	-47,700
January 31, 1985	3,618.97	888,400	-47,200
February 28	3,612.57	835,900	-52,500
March 31	3,614.07	847,700	+11,800
April 30	3,512.12	832,800	-14,900
May 31	3,616.87	872,600	+39,800
June 30	3,620.47	899,700	+27,100
July 31	3,617.37	876,500	-23,200
August 31	3,614.03	847,300	-29,200
September 30, 1985	3,614.94	856,200	+8,900
1985 water year			-212,800

* Does not include dead storage of 18,970 acre-ft.

MONTHLY SUMMARY OF CONTENTS FOR COMPACT RESERVOIRS EXISTING ON JANUARY 1, 1950

The extent, if any, of the use of reservoirs in this category which may be subject to Compact allocations was not determined. As a matter of hydrologic interest the monthend contents in acre-feet of four reservoirs are given. The first three reservoirs are in the Bighorn River basin, Wyoming, and data on contents were furnished by the U.S. Bureau of Reclamation. The Tongue River Reservoir in Montana is operated under the supervision of the Water Resources Division of the Montana Department of Natural Resources and Conservation, which furnished the operating data.

Contents, in acre-feet

Month	06224500 [a]/Bull Lake	[b]/Pilot Butte Reservoir	06281500 [c]/Buffalo Bill Reservoir	06307000 [d]/Tongue River Reservoir
September 30, 1984. . .	86,400	18,300	357,000	15,880
October 31.	90,460	18,700	346,000	23,350
November 30	90,720	18,460	331,100	22,750
December 31	89,960	18,300	316,600	19,670
January 31, 1985. . . .	89,570	18,300	304,000	16,100
February 28	89,200	18,060	286,700	10,150
March 31.	89,050	20,780	272,200	16,220
April 30.	87,050	22,040	260,800	36,200
May 31.	94,550	18,380	285,700	45,150
June 30	118,200	24,030	378,300	41,790
July 31	120,100	7,800	338,600	24,420
August 31	71,760	8,430	280,200	16,340
September 30, 1985. . .	31,890	15,610	239,500	12,500
Change in contents during water year. .	-54,510	-2,690	-117,500	-3,380

[a]/ Usable contents, from revised capacity table effective October 1, 1965. Dead storage is 722 acre-ft.

[b]/ Usable contents. Dead storage is 5,360 acre-ft.

[c]/ Usable contents, from revised capacity table based on survey of 1959. Contents prior to October 1960 based on survey of 1941. Dead storage is negligible.

[d]/ Usable contents. Dead storage is 1,400 acre-ft. Contents based upon sedimentation surveys of October 1948.

RULES AND REGULATIONS FOR ADMINISTRATION OF THE YELLOWSTONE RIVER COMPACT

A compact, known as the Yellowstone River Compact, between the States of Wyoming, Montana, and North Dakota, having become effective on October 30, 1951, upon approval of the Congress of the United States, which apportions the waters of certain interstate tributaries of the Yellowstone River which are available after the appropriative rights existing in the States of Wyoming and Montana on January 1, 1950, are supplied, and after appropriative rights to the use of necessary supplemental water are also supplied as specified in the Compact, the following rules and regulations are adopted subject to the provisions for amendment revision or abrogation as provided herein.

Article I. Collection of Water Records

A. It shall be the joint and equal responsibility of the members of the States of Wyoming and Montana to collect, cause to be collected, or otherwise furnish records of tributary streamflow at the points of measurement specified in Article V (B) of the Compact, or as near thereto as is physically or economically feasible or justified.

1. Clarks Fork

The gaging station known as Clarks Fork near Silesia, Montana and located in NW1/4 SE1/4 sec. 1, T. 4 S., R. 23 E., shall be the point of measurement for the Clarks Fork.

2. Bighorn River (exclusive of Little Bighorn River)

The gaging station known as the Bighorn River at Bighorn, Montana, and located in NE1/4 NE1/4 sec. 33, T. 5 N., R. 34 E., shall temporarily be the designated point of measurement on that stream. The flow of the Little Bighorn River as measured at the gaging station near Hardin, Montana, and located in SW1/4 NW1/4 sec. 20, T. 1 S., R. 34 E., shall be considered the point of measurement for that stream, except that if or when satisfactory records are not available, the records for the nearest upstream station with practical corrections for intervening inflow or diversion shall be used.

3. Tongue River

The gaging station known as the Tongue River at Miles City, Montana, and located in SE1/4 sec. 23, T. 7 N., R. 47 E., shall temporarily be the point of measurement for that stream.

4. Powder River

The gaging station known as the Powder River near Locate, Montana, and located in SE1/4 sec. 23, T. 8 N., R. 51 E., shall temporarily be the designated point of measurement for that stream.

B. Records of total annual diversion in acre-feet above the points of measurement designated in the Compact for irrigation, municipal, and industrial uses developed after January 1, 1950, shall be furnished by the members of the Commission for their respective States, at such time as the Commission deems necessary for interstate administration as provided by the terms of the Compact. Providing that if it be acceptable to the Commission, reasonable estimates thereof may be substituted.

C. Annual records of the net change in storage in all reservoirs, not excluded under Article V (E) of the Compact, above the point of measurement specified in the Compact and completed after January 1, 1950, and the annual net change in reservoirs existing prior to January 1, 1950, which is used for irrigation, municipal, and industrial purposes developed after January 1, 1950, shall be the primary responsibility of the member of the Commission in whose State such works are located; providing such data are not furnished by Federal agencies under the provisions of Article III (D) of the Compact, or collected by the Commission.

Article II. Office and Officers

A. The office of the Commission shall be located at the office of the Chairman of the Commission.

B. The Chairman of the Commission shall be the Federal representative as provided in the Compact.

C. The Secretary of the Commission shall be as provided for in Article III of these rules.

D. The credentials of each member of the Commission shall be placed on file in the office of the Commission.

Article III. Secretary

A. The Commission, subject to the approval of the Director of the United States Geological Survey, shall enter into cooperative agreements with the U.S. Geological Survey for such engineering and clerical services as may reasonably be necessary for the administration of the Compact. Said agreements shall provide that the Geological Survey shall:

1. Maintain and operate gaging stations at or near the points of measurement specified in Article V (A) of the Compact.

2. Assemble factual information on stream flow, diversion, and reservoir storage for the preparation of an annual report to the Governors of the signatory States.

3. Make such investigations and reports as may be requested by the Commission in aid of its administration of the Compact.

B. The Geological Survey shall act as Secretary to the Commission.

Article IV. Budget

A. At the annual meeting of each even-numbered year or prior thereto, the Commission shall adopt a budget for operation during the ensuing biennium beginning July first. Such budget shall set forth the total cost of construction, maintenance and operation of gaging stations, the cost of engineering and clerical aid, and other necessary expenses excepting the salaries and personal expenses of the Commissioners. On odd-numbered years revisions of the budget shall be considered.

B. It shall be the obligation of the Commissioners of the States of Montana and Wyoming to endeavor to secure from the Legislature of their respective States sufficient funds with which to meet the obligations of this Compact, except insofar as provided by the Federal government.

Article V. Meetings

An annual meeting of the Commission shall be held each November at some mutually agreeable point in the Yellowstone River Basin for consideration of the annual report for the water year ending the preceding September 30th, and for the transaction of such other business consistent with its authority; provided that by unanimous consent of the Commission the date and place of the annual meeting may be changed. Other meetings as may be deemed necessary shall be held at a time and place set by mutual agreement, for the transaction of any business consistent with its authority.

No action of the Commission shall be effective until approval by the Commissioners for the States of Wyoming and Montana.

Article VI. Amendments, Revisions and Abrogations.

The Rules and Regulations of the Commission may be amended or revised by a unanimous vote at any meeting of the Commission.

Gary Fritz
Commissioner for Montana

George L. Christopulos
Commissioner for Wyoming

ATTESTED:

L. Grady Moore
Federal Representative

Adopted November 17, 1953
Amended April 9, 1980

RULES FOR ADJUDICATING WATER RIGHTS ON INTERSTATE DITCHES

Article I. Purpose

The purpose of this rule is to determine and adjudicate, in accordance with the laws of Montana and Wyoming, those pre-Compact (January 1, 1950) water rights for diverting from the Powder, Tongue, Bighorn and Clarks Fork Rivers and their tributaries where the point of diversion is in one State and the place of use is in the other State.

Article II. Authority

In accordance with the Yellowstone River Compact, the State of Montana and the State of Wyoming, being moved by consideration of interstate comity, desire to remove all causes of present and future controversy between the States and between persons in one State and persons in another State with respect to these interstate ditches. Article III (E) of the Compact provides the Yellowstone River Compact Commission with the authority "....to formulate rules and regulations and to perform any act which they may find necessary to carry out the provisions of this Compact...."

Article III. Definitions

The terms defined in the Yellowstone River Compact apply as well as the following definitions:

1. "Acre-feet" means the volume of water that would cover 1 acre of land to a depth of 1 foot.

2. "Cubic foot per second" means a flow of water equivalent to a volume of 1 cubic foot that passes a point in 1 second of time and is equal to 40 miners inches in Montana.

3. "Interstate Ditches" shall include ditches and canals which convey waters of the Bighorn, Tongue, Powder, and Clarks Fork Rivers and their tributaries across the Wyoming-Montana State line where the water is diverted in one State and the place of use is in the other State.

4. "Department of Natural Resources and Conservation," hereafter called the "Department," means the administrative agency and Department of the Executive Branch of the Government of Montana created under Title II, Chapter 15, MCA which has the responsibility for water administration in that State.

5. "Water Court" means a Montana District Court presided over by a water judge, as provided for in Title III, Chapter 7, MCA.

6. "State Engineer" shall be the current holder of the position created by the Wyoming Constitution as Chief Water Administration Official for the State of Wyoming.

7. "Board of Control," hereinafter called the "Board," is defined as the constitutionally created water management agency in Wyoming composed of the four Water Division Superintendents and the State Engineer.

8. "Superintendent" is the member of the Board who is the water administration official for the Water Division where the interstate ditch is located. (The two Water Divisions in the Yellowstone River drainage are Water Division Numbers Two and Three.)

9. "Date of Priority" shall mean the earliest date of actual beneficial use of water, unless evidence and circumstances pertaining to a particular claim establish an earlier date.

10. "Point of Diversion" is defined to be the legal land description by legal subdivision, section, township, and range of the location of the diversion structure for an interstate ditch from a natural stream channel.

11. "Place of Use" is defined to be the legal land description (legal subdivision, section, township, and range) of the lands irrigated by an interstate ditch.

12. "Person" is defined as an individual, a partnership, a corporation, a municipality or any other legal entity, public or private.

13. "Claimant" is defined as any person claiming the use of water from an interstate ditch as herein defined.

Article IV. Procedures

The procedures for determining and adjudicating water rights associated with interstate ditches shall be categorized as follows: (A) Where the point of diversion is in Wyoming and place of use in Montana, and (B) Where the point of diversion is in Montana and place of use in Wyoming.

A. Wyoming Procedure

1. The Yellowstone River Compact Commission will provide a claim form to be completed by the claimant that will describe the location and point of diversion and land being irrigated, the priority date claimed, method of irrigation and such other information required to describe the claim.

2. The Yellowstone River Compact Commission will send the claim form to water users on the interstate ditches.

3. Water users will complete the claim form and file it with the Yellowstone Compact Commission, which, when found to be correct and complete, will be forwarded to the Board for verification.

4. Upon receipt of the form, the Board shall forward it to the appropriate Superintendent, who in cooperation with the Department, will validate the information including the use that has been made of the water, the number of acres and location of lands being irrigated, the priority date, and all other relevant information. The Superintendent and the Department will utilize aerial photography and other information to have prepared a reproducible map showing the location of the ditch system, lands irrigated, point of diversion, etc., of the claim.

5. After the validation procedure, the Superintendent will hold a hearing, after appropriate notice and advertisement, at which time the claimant shall describe, in detail, the use that has been made of the water and the lands that are being irrigated, establish a priority date, etc. Costs incurred in advertising shall be paid by the claimant. If a single hearing is held to consider several claims, the costs of advertising shall be shared equally among the claimants. Anyone who opposes the claim shall appear and state the reasons, if any, for opposition to the claim. If there is no opposition to the claim, cost incurred in holding the hearing shall be paid by the claimant. If protestants do appear and oppose the claim, hearing costs will be paid 50 percent by the claimant and 50 percent by the protestant, or if there is more than one protestant, the remaining 50 percent shall be shared equally among the protestants.

6. At the conclusion of the hearing, the Superintendent shall forward the record to the Yellowstone River Compact Commission with findings and recommendations. The Yellowstone River Compact Commission will make the

determination of the amount of the right, the location, and the priority date, and then send the record to the Board.

7. The Board shall review the record and integrate it into its water rights system. Upon entry of the record by the Board, the information shall be forwarded to the Department and the Chairman of the Yellowstone River Compact Commission.

8. Upon the entry of the right into the Board's records, it would have the following attributes:

   a. The right will be a Wyoming water right with a priority date as established by this procedure.

   b. The amount of the right will be determined as provided by Wyoming law, i.e., 1 cfs per 70 acres, with an additional 1 cfs if the right has priority earlier than March 1, 1945, under the Wyoming Surplus Water Law, 41-4-318 and 41-4-319, W.S. 1977.

B. Montana Procedure

1. The Yellowstone River Compact Commission will provide a claim form to be completed by the claimant that will describe the location and point of diversion and land being irrigated, the priority date claimed, method of irrigation and such other information required to describe the claim.

2. The Commission will send the claim form to water users on the interstate ditches.

3. Water users will complete the claim form and file it with the Yellowstone River Compact Commission, which, when found to be correct and complete, will be forwarded to the Department for verification.

4. Upon receipt of the form, the Department, in cooperation with the Wyoming State Engineer's Office, will validate the information, including the use that has been made of the water, the number of acres and location of lands being irrigated, the priority date, and all other relevant information. The appropriate Superintendent and the Department will utilize aerial photographs and other information to have prepared a reproducible map showing the location of the ditch system, land irrigated, point of diversion, etc., of the claim.

5. The Department would then forward the record to the Yellowstone River Compact Commission with its findings and recommendations. Upon approval by the Commission, the record shall be submitted to the Montana Water Court for adjudication. A duplicate record will be forwarded to the Wyoming State Engineer's Office, the Board, and the Chairman of the Yellowstone River Compact Commission upon adjudication.

6. Upon adjudication of the right by the Montana Water Court, it would have the following attributes:

   a) The right will be a Montana water right with a priority date as established by this procedure.

   b) The amount of the right will be determined as provided by Montana law.

Article V. Exclusions

A. These rules recognize the limitation in Article VI of the Yellowstone River Compact regarding Indian water rights.

B. These rules shall not be construed to determine or interpret the rights of the States of Wyoming and Montana to the waters of the Little Bighorn River.

Article VI. Claim Form Submission Period

All claims must be submitted to the Yellowstone River Compact Commission, c/o L. Grady Moore, United States Geological Survey, 821 E. Interstate, Bismarck, ND 58501 no later than December 31, 1984.

Gary Fritz
Commissioner for Montana

George L. Christopulos
Commissioner for Wyoming

ATTESTED:

L. Grady Moore
Federal Representative

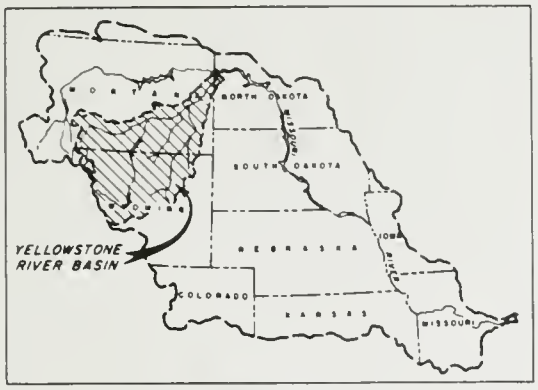
Adopted September 20, 1984

METRIC CONVERSION TABLE

The following factors may be used to convert the inch-pound units published herein to the International System (SI) of metric units. Subsequent reports will contain both the inch-pound and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

Multiply inch-pound units	By	To obtain SI units
	Length	
feet (ft)	.3048	meters (m)
miles (mi)	1.609	kilometers (km)
	Area	
acres	4047	square meters (m^2)
	.4047	*hectares (ha)
	.4047	square hectometer (hm^2)
	.004047	square kilometers (km^2)
square miles (mi^2)	2.590	square kilometers (km^2)
	Volume	
cfs-day (ft^3/s-day)	2447	cubic meters (m^3)
	.002447	cubic hectometers (hm^3)
acre-feet (acre-ft)	1233	cubic meters (m^3)
	.001233	cubic hectometers (hm^3)
	.000001233	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	28.32	liters per second (L/s)
	28.32	cubic decimeters per second (dm^3/s)
	.02832	cubic meters per second (m^3/s)

*The unit hectare is approved for use with the International System (SI) for a limited time. See NBS Special Bulletin 330, p. 15, 1972 edition.



LOCATION MAP

YELLOWSTONE RIVER COMPACT COMMISSION

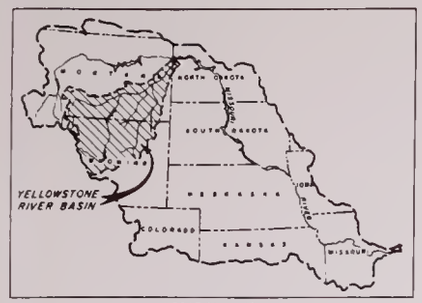
YELLOWSTONE RIVER BASIN

EXPLANATION

▲ COMPACT STREAM-GAGING STATIONS
◧ RESERVOIR-CONTENT STATIONS

10 0 10 20 30 40 MILES
10 5 0 10 20 30 40 50 60 KILOMETERS

MAP SHOWING LO NS



LOCATION MAP

YELLOWSTONE RIVER COMPACT COMMISSION

YELLOWSTONE RIVER BASIN

EXPLANATION

▲ COMPACT STREAM-GAGING STATIONS

◧ RESERVOIR-CONTENT STATIONS

10 0 10 20 30 40 MILES

10 5 0 10 20 30 40 50 60 KILOMETERS

MAP SHOWING LOCATIONS OF COMPACT STREAM-GAGING AND RESERVOIR-CONTENT STATIONS